

Appl. No.: 09/773,839  
Amtd. Dated: January 3, 2005  
Reply to Office Action of: July 1, 2004

APP 1284

## REMARKS/ARGUMENTS

In response to the Examiner's objection to the specification, applicants have amended the specification at page 5 to correct the inconsistency with FIG.1 and at page 11-12 to correct the typographical error pointed out by the Examiner. Furthermore the applicants have amended claims 1, 11-12 and 16-19 to correct certain informalities to which the Examiner objected.

Claims 1-20 of the present application have been rejected by the Examiner under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

Applicants contend that the method of estimation of bandwidth between nodes described in the application would enable one skilled in the art to practice the invention. It is clear from the specification at lines 18-20 of page 5 that there is a transfer of data between node 70 and node 80. Applicants respectfully refer the Examiner to the discussion at page 5 which states that "[p]ackets of data are sent from the remote host to each node 70 and 80. The data consist of different packet sizes resulting in varying corresponding delay. It is also assumed that the data packets first reach node 70 and then node 80." With regard to Examiner's second Section 112, first paragraph rejection, claim 13 has been amended to remove the recitation of claim 6 and to include the limitation of claim 6 in its entirety.

Claims 1-20 have also been rejected by the Examiner under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which the applicants regard as their invention. The Examiner has rejected claims 1-10 as not being clear to one of ordinary skill in the art which channel through the network is taken by each set of data packets. It is not important in the present invention which path is taken. The method and system of the present invention rely on statistical manipulation of collected delay times in order to estimate bandwidth. There is no recitation in claim 1 of a "channel" through the network to be taken by the data packets.

With regard to claim 1 the term "total hop delay" has been deleted.

Claim 2 has been amended to remove the need for an antecedent basis for "the total packet-size independent delay" and "the delay per byte." Claim 2 now refers to generating "a first estimate of total packet-size independent delay" and "delay per byte."

Claims 3 and 5 have been amended by rewording the claims so as to delete the phrase "such as" in each claim. Claims 2 and 3 have been amended to delete the term "robust."

Applicants do not believe any additional antecedent basis is necessary for the term "the squared residuals" at line 6 of claim 3. It is clear that this term is related to the preceding equation in which "r" is a residual and  $r^2$  is a squared residual.

Appl. No.: 09/773,839  
Amtd. Dated: January 3, 2005  
Reply to Office Action of: July 1, 2004

APP 1284

Claim 5 has been amended so that it is now clear that the Bayesian analysis has an antecedent basis in claim 4 for "Bayesian point analysis."

Claim 7 states that the set of delay times is based on the minimum delay time where the same packet size is sent to the respective nodes multiple times. Applicants are unaware of any other way to describe the minimum, i.e., in any set of numbers (such as delay times) there will always be the minimum.

Claim 11 has been amended to more clearly and distinctly claim the invention by changing "the traffic and router characteristic parameters" to "a traffic and router characteristic parameter."

Claims 11 and 14 have been amended to more distinctly claim the invention by clarifying that the estimate of the available bandwidth as a function of time is based on said set of first delay times, said set of second delay times and the traffic and router characteristic parameter rather than the average available bandwidth for a short period of time.

Claim 13 has been amended to more distinctly claim the invention and the term "the estimated bandwidth" no longer appears in claim 13.

Claim 17 has been amended to delete the term "total" as the claim is directed toward a system for the estimation of bandwidth rather than "total" bandwidth.

Claim 19 has been amended to avoid a need for an antecedent basis for the term "the available bandwidth and to comport with claims 1 and 11.

The Examiner has rejected claims 1-2, 8-10, and 17 under 35 U.S.C. § 102(e) as being anticipated by United States Patent No. 6,201,791 (Bournas). Bournas discloses a method and apparatus for measuring flow capacity of and determining the optimal window size of a communications network. The method is aimed at capacity estimation between a source node and a destination node. The packets are generated and transmitted at the source node. In independent claims 1, 11 and 17 of the present invention it is clear that the packets are generated at a remote host and not at either the first node or second node in a network. The present invention is directed to a method and system for remotely estimating bandwidth between nodes in a communications network. Furthermore, the present invention requires and claims the generating and sending of a plurality of randomly-sized data packet pairs in order to reduce the effect of packet-size dependent delay. This is neither taught nor suggested by Bournas. Applicants contend that Bournas does not anticipate claims 1, 11 and 17 for at least these two reasons and, therefore, Bournas cannot anticipate dependent claims 2 or 8-10 as argued by the Examiner.

The Examiner has also rejected claim 3 under 35 U.S.C. §103(a) as being unpatentable over Bournas further in view of Kratz et al. Applicants contend that Kratz does

Appl. No.: 09/773,839  
Amtd. Dated: January 3, 2005  
Reply to Office Action of: July 1, 2004

APP 1284

not teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. Kratz cannot, therefore, overcome the deficiencies in Bournas and claim 3, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by Kratz, alone, or in combination with Bournas.

The Examiner has also rejected claim 4 under 35 U.S.C. §103(a) as being unpatentable over Bournas further in view of Malakoff. Malakoff appears to be a general discussion of the use of Bayesian analysis. Applicants contend that Malakoff does not teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. Malakoff cannot, therefore, overcome the deficiencies in Bournas and claim 4, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by Malakoff, alone, or in combination with Bournas.

The Examiner has also rejected claims 5 and 6 under 35 U.S.C. §103(a) as being unpatentable over Bournas and Malakoff further in view of United States Patent No. 6,115,718 to Huberman et al. Huberman et al. discloses a method for predicting document access in a collection of linked documents. Huberman is not related art. Applicants contend that Huberman et al. does not teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. Huberman cannot, therefore, overcome the deficiencies in Bournas and claims 5 and 6, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by Huberman, alone, or in combination with Bournas.

The Examiner has also rejected claim 7 under 35 U.S.C. §103(a) as being unpatentable over Bournas further in view of United States Patent No. 5,477,531 to McKee et al. McKee et al. is directed to a means for testing communications between two stations by sending a test packet from the first station to the second. Applicants contend that McKee et al. does not teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. McKee et al. cannot, therefore, overcome the deficiencies in Bournas and claim 7, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by McKee et al., alone, or in combination with Bournas.

The Examiner has also rejected claims 11, 14, 18 and 19 under 35 U.S.C. §103(a) as being unpatentable over Bournas further in view of United States Patent No. 6,002,671 to Kahkoska et al. Kahkoska et al. discloses a method for testing ADSL (digital subscriber line) circuits by connecting a test instrument at a customer premises (i.e., home or office) and

Appl. No.: 09/773,839  
Amtd. Dated: January 3, 2005  
Reply to Office Action of: July 1, 2004

APP 1284

connecting another test instrument at the central office connected to the customer premises by twisted pair telephone line. First, applicants would like to note that the subject matter of Kahkoska et al. is directed to coupling test instruments through DSL. Applicants contend that Kahkoska et al. does not teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. Kahkoska et al. cannot, therefore, overcome the deficiencies in Bournas and claims 11, 14, 18 and 19, as well as the independent claims 1 and 17, are neither taught nor suggested by Kahkoska, alone, or in combination with Bournas. Furthermore, applicants contend that Kahkoska does not teach or suggest the generation of a known quantity of traffic at a location remote from the host that is responsible for generating the plurality of randomly sized data packets. There is no discussion in Kahkoska of any hardware remote from the two test instruments that are used to communicate and test a DSL line.

The Examiner has also rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over Bournas in view of Kahkoska further in view of United States Patent No. 6,285,972 (Barber). Barber is not related to the present application. Barber discloses a system for generating an improved nonlinear system model. There is no connection between this and the remote estimation of bandwidth in a communications network. Applicants contend that Barber does not teach or suggest the generation or transmission of randomly-sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. Barber cannot, therefore, overcome the deficiencies in the primary reference Bournas and claim 12, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by Barber, alone, or in combination with Bournas and/or Kahkoska.

The Examiner has also rejected claim 13 under 35 U.S.C. §103(a) as being unpatentable over Bournas in view of Kahkoska and Barber, further in view of Huberman et al. Applicants contend that none of these references even if they could be combined teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate bandwidth between two nodes in a communications network. Claim 13, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by any of these myriad references, alone, or in combination with one another.

The Examiner has also rejected claim 16 under 35 U.S.C. §103(a) as being unpatentable over Bournas further in view of United States Patent No. 6,483,805 (Davies et al.). Applicants contend that Davies does not teach or suggest the generation or transmission of randomly sized data packets from a remote location in order to remotely estimate

Appl. No.: 09/773,839  
Amtd. Dated: January 3, 2005  
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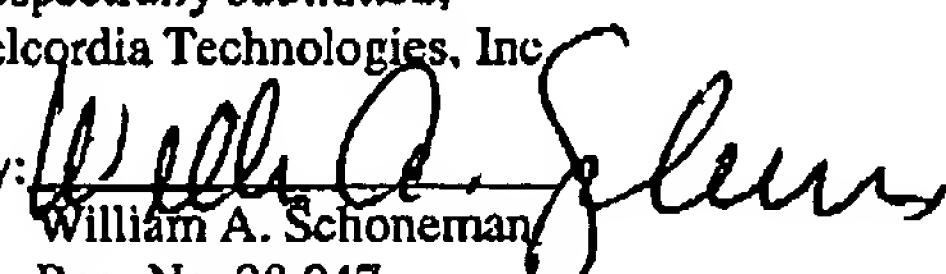
APP 1284

bandwidth between two nodes in a communications network. Davies cannot, therefore, overcome the deficiencies in Bournas and claim 16, as well as, independent claims 1, 11 and 17 are neither taught nor suggested by Davies, alone, or in combination with Bournas. Furthermore, Davies does not teach or suggest the estimation of a traffic and router characteristic parameter ( $\gamma$ ) as disclosed in the specification of the present application.

Bournas do not teach or suggest applicants' novel methods and systems alone or in combination as set forth in amended claims 1-20, applicants submit that these claims are clearly allowable. Favorable reconsideration and allowance of these claims are therefore requested.

Applicants earnestly believe that this application is now in condition to be passed to issue, and such action is also respectfully requested. However, if the Examiner deems it would in any way facilitate the prosecution of this application, he is invited to telephone applicants' agent at the number given below.

A petition for a three-month extension of time is enclosed herewith.

Respectfully submitted,  
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